

What is claimed is:

1. A system for processing a workpiece, comprising:

a plurality of workpiece processors, with at least one of the workpiece processors comprising:

5 an upper rotor having a through air flow opening;

a lower rotor engageable to the upper rotor to form a workpiece processing chamber; and

a robot moveable between the workpiece processors for loading and unloading a workpiece into and out of one or more processors.

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2. The system of claim 1 wherein the through air flow opening in the upper rotor has a diameter which is 20-80% of the diameter of the workpiece.

3. The system of claim 1 further comprising an upper fluid applicator
15 extending into the through opening in the upper rotor, to provide a processing fluid to an upper surface of the workpiece.

4. The system of claim 3 further comprising an actuator for moving the upper fluid applicator within the through opening for distributing a processing fluid to different portions of the workpiece.

5 5. The system of claim 4 wherein the upper fluid applicator comprises a nozzle having a collection section for collecting processing fluid when fluid delivery to the upper nozzle is discontinued so that excess processing fluid does not drip from the upper nozzle into the processing chamber.

10 6. The system of claim 1 further comprising a lower fluid applicator extending through the lower rotor for introducing a processing fluid to a lower surface of a workpiece.

7. The system of claim 1 further comprising a plurality of spacing
15 members for holding a workpiece between the upper and lower rotor members.

8. The system of claim 1 further comprising a spin motor linked to the lower rotor.

9. The system of claim 8 wherein the spin motor has a maximum rotational velocity of approximately 4000 rpm.

10. The system of claim 8 wherein the spin motor accelerates from 0 to
5 1800 rpm in approximately 2 to 4 seconds.

11. The apparatus of claim 1 further comprising magnet means for engaging the upper and lower rotors.

10 12. The system of claim 1 further comprising a sump at a central area of the lower rotor.

13. The system of claim 1 further comprising a moveable drain assembly including a plurality of drain paths, with each drain path separately alignable with the
15 processing chamber by vertically moving the drain assembly.

14. The system of claim 1 further comprising an air supply line in communication with the processing chamber and having an inlet located vertically above the processing chamber for delivering clean air into the processing chamber.

15. A system for processing a workpiece, comprising:

a plurality of workpiece processors, with at least one of the workpiece processors comprising:

5 an upper rotor;

a lower rotor engageable with the upper rotor to form a workpiece processing chamber;

a robot moveable between the processors for loading and unloading workpieces into and out of the processors; and

10 a moveable drain assembly including a plurality of separate drain paths, with each drain path separately alignable with the processing chamber by moving the drain mechanism to align a single drain path with the processing chamber.

16. The system of claim 15 wherein the lower rotor is at a fixed vertical position, and the upper rotor and the drain assembly are moveable vertically, relative to the lower rotor.

17. The system of claim 15 wherein the upper rotor has a central through opening for air flow having a diameter of 20-80% of the diameter of the workpiece.

18. The system of claim 15 further comprising a nozzle extending into the upper rotor for introducing a processing fluid to an upper surface of a workpiece.

5 19. The system of claim 15 further comprising a loading station, with the robot moveable from the loading station to one or more of the workpiece processors.

20. The system of claim 15 wherein the workpiece processors are arranged in a first row and a second row, with the robot moveable between the two
10 rows.

21. A system for processing a workpiece, comprising:

a plurality of workpiece processors, with at least one of the workpiece processors comprising:

15 an upper rotor having a first magnetic element;

a lower rotor having a second magnetic element, with the upper rotor engageable to the lower rotor via interaction of the magnetic elements, to form a workpiece processing chamber; and

a robot moveable between the workpiece processors for loading and unloading a workpiece into and out of one or more processors.

22. The system of claim 21 with the upper rotor having a through opening
5 with a diameter which is 20-80% of the diameter of the workpiece.

23. The system of claim 21 further comprising an upper fluid applicator
extending into the through opening in the upper rotor, to provide a processing fluid
to an upper surface of the workpiece.

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24. The system of claim 21 further comprising an actuator for moving the
upper fluid applicator within the through opening for distributing a processing fluid to
different portions of the workpiece, and for moving the upper fluid applicator
vertically and radially out of the processing chamber.

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25. The system of claim 21 further comprising a lower fluid applicator
extending through the lower rotor for introducing a processing fluid to a lower
surface of a workpiece.

26. The system of claim 21 further comprising a moveable drain assembly including a plurality of drain paths, with each drain path separately alignable with the processing chamber by vertically moving the drain assembly.

5 27. A system for processing a workpiece, comprising:

a plurality of workpiece processors, with at least one of the workpiece processors comprising:

a first rotor;

a second rotor

10 engagement means for engaging the first rotor to the second rotor, without the need for physical contact with the first rotor; and

loading means for loading a workpiece into and out of one or more of the processors.

15 28. The system of claim 27 wherein the engagement means comprises elements for creating magnetic repulsion or attraction between the first and second rotors.

29. The system of claim 27 further comprising drain means for separately draining fluids from the processing chamber.

30. A method of processing a workpiece, comprising the steps of:

5 placing the workpiece into a first rotor;

engaging a second rotor to the first rotor via a non-contact force, to form a processing chamber around the workpiece;

spinning the first and second rotors; and

10 applying a first processing fluid to a first side of the workpiece, with the first processing fluid flowing radially outwardly over the first side of the workpiece via centrifugal force.

31. The method of claim 30 further comprising the step of removing the first processing fluid from the processing chamber via a first drain path located in a moveable drain mechanism in communication with the processing chamber.

32. The method of claim 30 wherein the non-contact force comprises magnetic force.

33. A system for processing a workpiece, comprising:

a plurality of workpiece processors, with at least one of the workpiece processors comprising:

an upper rotor;

5 a lower rotor engageable to the upper rotor to form a workpiece processing chamber;

a moveable drain assembly alignable with the processing chamber, the drain assembly separated from the processing chamber by a gap in which a downward airflow is created when the drain assembly is lowered and/or the upper rotor is
10 raised; and

a robot moveable between the workpiece processors for loading and unloading a workpiece into and out of one or more processors.

34. The system of claim 33 wherein the gap is 0.125 to 0.250 inches wide.

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